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Washington, D.C. 20231



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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO (If known, see 37 CFR 1.5) 09/423746
INTERNATIONAL APPLICATION NO. PCT/EP98/02828	INTERNATIONAL FILING DATE May 7, 1998	PRIORITY DATES CLAIMED: May 14, 1997	
TITLE OF INVENTION - see attached pages -			
APPLICANT(S) FOR DO/EO/US - see attached pages -			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information: 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(l).			

- See attached pages for additional data -

#169818

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Nilo FAGIOLINI et al.

International Appln. No.: PCT/EP98/02828

Filed: November 15th, 1999

Attorney Dkt. No.: 32232-152197

For: PULVERULENT REACTIVE COMPOSITION AND PROCESS FOR THE
PURIFICATION OF A GAS

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to initial examination of the application, please amend the above-identified
application as follows:

IN THE CLAIMS:

Please amend claims 1-10 as follows:

1. (Amended) Solid pulverulent reactive composition for the purification of a gas,
comprising sodium bicarbonate and a caking inhibitor for sodium bicarbonate[, characterized in
that the inhibitor comprises] and being substantially devoid of silica, said inhibitor comprising
lignite coke and/or a magnesium compound comprising magnesium (hydr)oxide.

2. (Amended) The [C]composition according to Claim 1, [characterized in that it is
substantially devoid of silica] wherein said magnesium compound comprises basic magnesium
carbonate.

3. (Amended) The [C]composition according to Claim 1 [or 2], [characterized in that the magnesium compound comprises basic magnesium carbonate] comprising at least 90% by weight of sodium bicarbonate, and an inhibitor present in an amount by weight of greater than 0.5% of the weight of sodium bicarbonate.

4. (Amended) The [C]composition according to [any one of Claims 1 to 3] Claim 3, [characterized in that it] wherein the inhibitor comprises [at least 90% by weight of sodium bicarbonate and in that its content] a magnesium compound in an amount by weight [of inhibitor is greater than 0.5% of the] at least equal to 2% of the weight of sodium bicarbonate.

5. (Amended) The [C]composition according to Claim [4] 3, [characterized in that, in] wherein the [case where the] inhibitor comprises [a magnesium compound, the latter is present in an amount by weight at least equal to 2%] lignite coke in an amount at least equal to 5% of the weight of sodium bicarbonate.

6. (Amended) [Composition according to] A process for the purification of a gas, comprising introducing a reactive composition in accordance with Claim [4] 1[, characterized in that, in the case where the inhibitor comprises lignite coke, the latter is present in an amount at least equal to 5% of the weight of sodium bicarbonate] into the gas and subjecting the gas to removal of dust.

7. (Amended) The [P]process according to Claim 6, wherein said subjecting [for] the [purification of a] gas[, according to which a reactive composition comprising sodium bicarbonate is introduced into the gas and the gas is subjected] to removal of dust[, characterized in that the reactive composition is substantially devoid of silica] comprises filtrating the gas through a filter cloth.

8. (Amended) The [P]process according to Claim [7] 6, [characterized in that the removal of dust comprises filtration through a filter cloth] for the purification of a gas from at least one contaminant selected from the group consisting of hydrogen chloride, hydrogen fluoride, sulfur oxides, nitrogen oxides, dioxins and furans.

9. (Amended) The [P]process according to Claim 7 [or 8], wherein [characterized in that] the reactive composition is in accordance with [any one of] Claim[s] 2 [to 6].

Claim 10, line 1, delete "any one of Claims 7 to 9" and insert Claim 7--.

REMARKS

Claims 1 to 10 are pending in this application. By this Amendment, the claims are amended to delete multiple dependency, and to better define the subject matter which applicants regard as their invention.

Respectfully submitted,



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Date: November 15th, 1999

Pulverulent reactive composition and process for the
purification of a gas

5 The invention relates to the purification of
gases.

It relates more particularly to a reactive composition based on sodium bicarbonate which can be used for the purification of gases.

Human activities generate large amounts of
10 gases contaminated by toxic substances. Hydrogen chloride, hydrogen fluoride, sulphur oxides, nitrogen oxides, dioxins and furans are examples of toxic substances which are frequently found in these gases. Variable amounts of them are found in particular in the
15 flue gases generated by plants for the incineration of domestic or hospital waste and in the flue gases generated by the combustion of fossil fuels, in particular in thermal power stations for the generation of electricity and in centralized district heating
20 plants. These flue gases generally have to be freed from these toxic substances before being discharged to the atmosphere.

The Neutrec[®] process [Solvay (Société Anonyme)] is an efficient process for purifying gases. According
25 to this known process, sodium bicarbonate, in the form of a powder, is injected into the gas and the gas thus treated is subsequently conveyed to a filter for removal of the dust therefrom (Solvay S.A., booklet Br. 1566a-B-1-0396).

30 Sodium bicarbonate powder has a natural tendency to cake, which constitutes a disadvantage. The addition of silica thereto has been contemplated in order to combat this disadvantageous property of sodium bicarbonate (Klein Kurt - "Grundlagen und Anwendungen
35 einer durch Flammenhydrolyse gewonnenen Kieselsäure: Teil 4: Aerosil zur Verbesserung des Fließverhaltens pulverförmiger Substanzen" [Principles and applications of a silica produced by flame hydrolysis: Part 4: Aerosil for the improvement of the flow characteristics

of pulverulent substances] - Seifen-Ole-Fette-Wachse -
20 Nov. 1969, p. 849-858). However, sodium bicarbonate
to which silica has been added has not proved to be
very satisfactory in the purification of gases
5 comprising hydrogen chloride.

The invention overcomes this disadvantage by
providing a pulverulent reactive composition comprising
sodium bicarbonate which exhibits good resistance to
caking and satisfactory effectiveness in purifying a
10 gas.

The invention consequently relates to a solid
pulverulent reactive composition for the purification
of a gas, the said composition comprising sodium
bicarbonate and a caking inhibitor for sodium
15 bicarbonate and being characterized in that the
inhibitor comprises lignite coke and/or a magnesium
compound comprising magnesium (hydr)oxide.

Lignite coke is a product obtained by
carbonization of lignite, which is a solid fossil fuel
20 exhibiting a calorific value of less than 8,300 Btu/lb
(19.3 kJ/g) according to ASTM Standard D 388 (Ullmann's
Encyclopedia of Industrial Chemistry, 5th Edition,
Vol. A 7, 1986, pages 160-161).

The term "magnesium (hydr)oxide" is understood
25 to denote simultaneously magnesium oxide, magnesium
hydroxide or mixtures of magnesium oxide and magnesium
hydroxide. The magnesium compound advantageously
comprises basic magnesium carbonate of general formula
 $4\text{MgCO}_3 \cdot \text{Mg}(\text{OH})_2 \cdot 4\text{H}_2\text{O}$.

30 In addition to the sodium bicarbonate and the
inhibitor, the reactive composition according to the
invention can optionally comprise other constituents,
for example sodium monocarbonate or active charcoal.

The reactive composition according to the
35 invention preferably comprises more than 85%
(advantageously at least 90%) by weight of sodium
bicarbonate. Its content by weight of inhibitor is
preferably greater than 0.5% (advantageously at least
equal to 2%) of the weight of sodium bicarbonate. The

content by weight of inhibitor generally does not exceed 10% (preferably 7%) of the weight of the sodium bicarbonate. In the case where the inhibitor comprises lignite coke, the latter is preferably present in an amount by weight of greater than 3% (advantageously at least equal to 5%) of the weight of the sodium bicarbonate. In the case where the inhibitor comprises a magnesium compound as defined above, the latter is preferably present in an amount by weight of greater than 1% (advantageously at least equal to 2%) of the weight of the sodium bicarbonate.

In the case where the reactive composition according to the invention comprises sodium monocarbonate (of general formula Na_2CO_3), it is desirable for its content by weight of sodium monocarbonate to be less than 2% (preferably at most equal to 1%) of the overall weight of sodium bicarbonate and sodium monocarbonate.

In an especially recommended embodiment of the composition according to the invention, the latter exhibits a particle size defined by a mean particle diameter of less than 50 μm (preferably at most equal to 30 μm) and a particle size slope of less than 5 (preferably at most equal to 3). In this embodiment of the invention, the mean diameter (D_m) and the particle size slope (σ) are defined by the following relationships:

$$D_m = \frac{\sum n_i \times D_i}{\sum n_i} \text{ [sic]}, \quad \sigma = \frac{D_{90} - D_{10}}{D_{50}} \text{ [sic]}$$

in which n_i denotes the frequency (by weight) of the particles of diameter D_i , and D_{90} (D_{50} and D_{10} respectively) represents the diameter at which 90% (50% and 10% respectively) of the particles of the reactive composition (expressed by weight) have a diameter of less than D_{90} (D_{50} and D_{10} respectively). These particle

size parameters are defined by the method of analysis by laser radiation scattering using a Sympatec measuring device, Helos 12LA model, manufactured by Sympatec GmbH.

5 According to another recommended embodiment of the composition according to the invention, the latter is substantially devoid of silica. The phrase "substantially devoid of silica" is understood to mean that the amount of silica in the reactive composition
10 is insufficient to have a perceptible influence on the caking of the sodium bicarbonate, in the presence of atmospheric air, at a temperature of 20°C and at standard atmospheric pressure. The composition according to the invention is preferably entirely
15 devoid of silica. Everything else being equal, the composition in accordance with this embodiment of the invention exhibits optimum effectiveness as purification agent for gases.

 The reactive composition according to the
20 invention is applied as agent for the purification of gases contaminated by hydrogen chloride, hydrogen fluoride, sulphur oxides (mainly sulphur dioxide), nitrogen oxides (mainly nitric oxide NO and nitrogen peroxide NO₂), dioxins and furans. It is especially
25 advantageously applied in the purification of the flue gases generated by incinerators of municipal waste or hospital waste.

 The invention also relates to a process for the purification of a gas, according to which a reactive
30 composition comprising sodium bicarbonate is introduced into the gas and the gas is subsequently subjected to removal of dust, the process being characterized in that the reactive composition is substantially devoid of silica.

35 In the process according to the invention, the reactive composition is introduced in the solid state into the gas. The temperature of the gas is generally greater than 100°C (preferably greater than 125°C) during the introduction of the reactive composition. It

is recommended that the temperature of the gas should not exceed 800°C, preferably 600°C. Temperatures of 140 to 250°C are highly suitable. The reactive composition is generally introduced into a stream of gas moving in
5 a reaction chamber. The contaminants of the gas are, in the reaction chamber, adsorbed on the sodium bicarbonate particles (in the case of dioxins or furans) or react with the latter to form solid waste (for example, sodium chloride or fluoride, sodium
10 sulphate or sodium nitrite and nitrate, depending on whether the contaminants of the gas comprise hydrogen chloride, hydrogen fluoride, sulphur oxides or nitrogen oxides). The function of the removal of dust from the gas is to extract the solid waste thus formed
15 therefrom. Dust removal can be carried out by any appropriate known means, for example by mechanical separation in a cyclone, by filtration through a filter cloth or by electrostatic separation. Filtration through a filter cloth is preferred.

20 In accordance with the invention, it has been found that reactive compositions comprising sodium bicarbonate which are substantially devoid of silica are more effective in the purification of gases than sodium bicarbonate compositions comprising silica. This
25 improved effectiveness of the compositions according to the invention with respect to those comprising silica becomes evident mainly in the case where the removal of dust is carried out by means of a filter cloth. Although not wishing to be bound by a theoretical
30 explanation, the inventors believe that this greater effectiveness of the silica-free compositions can be attributed to the fact that these compositions adhere better to the filter cloth than the silica-comprising compositions.

35 In an advantageous embodiment of the process according to the invention, the reactive composition which is introduced into the gas is in accordance with the reactive composition according to the invention defined above and comprises, for this purpose, lignite

coke and/or a magnesium compound comprising magnesium (hydr)oxide.

5 The process according to the invention is especially advantageously applied in the purification of a flue gas originating from the incineration of municipal waste or hospital waste, this waste generally comprising chlorinated compounds and metal chlorides capable of generating hydrogen chloride during incineration. This waste generally also comprises heavy
10 metals and sulphur-comprising waste, in particular sulphur dioxide, which are found at least partly in the flue gas. In this specific application of the process according to the invention, the solid product which is collected from the removal of dust consequently usually
15 comprises, in addition to sodium chloride, heavy metals in the metallic or combined state, as well as sodium carbonate and sodium sulphate. This solid product can be treated in the way set out in International Application WO 93/04983 [Solvay (Société Anonyme)].

20 The process according to the invention is also applied in the purification of flue gases generated by the combustion of fossil fuels (natural gas, liquid petroleum derivatives, coal), these flue gases being contaminated by sulphur dioxide and nitrogen oxides.

25 Furthermore, the process according to the invention is applied in the purification of fuel gases obtained by coal gasification, these gases generally being contaminated by hydrogen chloride, hydrogen fluoride and sulphur dioxide.

30 The advantage of the invention will emerge from the description of the following examples, with reference to the appended drawings.

Figure 1 diagrammatically shows a stack of bags comprising a reactive composition;

35 Figure 2 diagrammatically shows a device used to define the mobility of a pulverulent reactive composition.

In these figures, the same reference numbers denote identical components.

First series of tests.

Examples 1 to 6 relate to storage tests on reactive compositions in accordance with the invention, with the aim of assessing their resistance to caking.

5 To this end, in each of these examples, a solid and pulverulent reactive composition was bagged up in 15 polyethylene bags weighing 40 kg, which bags were hermetically sealed. The 15 bags were stacked on a support 7, in the way represented in Figure 1, so as to
10 form five rows (1, 2, 3, 4, 5) of three bags 6, and the stack of bags was stored in a warehouse with normal ventilation which is maintained at ambient temperature. After storage, the bags were opened, samples were withdrawn therefrom in a random manner and two tests
15 were carried out on the samples withdrawn. A first test served to define the tendency of the composition to cake. The second test served to evaluate the mobility of the reactive composition, that is to say its ability to flow freely.

20 For the test targeted at defining the tendency to cake, the bags were poured out onto a graded screen with rectangular mesh openings of 12 x 19 mm and the degree of caking of the powder was defined by the relationship

25 $D = \frac{\text{Amount by weight of agglomerates retained on the screen}}{\text{Total weight of powder poured onto the screen}} \times 100$

Total weight of powder poured onto the screen

For the test targeted at defining the mobility of the reactive composition, use was made of the device represented diagrammatically in Figure 2. The device
30 comprises a sieve 9, exhibiting a mesh size of 710 μm , positioned above a vertical cylinder 10 with a diameter of 50 mm. For the test, the powder was poured through the sieve, the powder was collected on the top horizontal face 11 of the cylinder 10 and the maximum
35 height of the cone of powder 12 formed on the face 11 of the cylinder 10 was measured. According to this test, the mobility of the powder increases as the height of the cone 12 decreases.

Example 1

In this example, use was made of a reactive composition comprising milled and screened sodium bicarbonate, 0.48% by weight of silica and 4.6% by weight of lignite coke (the contents of silica and of lignite coke are expressed with respect to the weight of sodium bicarbonate). The screening of the sodium bicarbonate was adjusted so that the latter is in the form of particles not exceeding 13 μm in diameter, the reactive composition exhibiting a particle size defined by the following characteristics (defined above), expressed in μm :

D10 [sic] = 7.0

D50 [sic] = 29.7

D90 [sic] = 70.3

After storage for three months, the composition was subjected to the two tests defined above. The following results were obtained:

Tendency to cake (test on three

samples):

Sample No. 1: 0.50%

Sample No. 2: 2.98%

Sample No. 3: 0.11%

Mobility (test on five samples):

Sample No. 1: 40 mm

Sample No. 2: 36 mm

Sample No. 3: 40 mm

Sample No. 4: 39 mm

Sample No. 5: 38 mm

Mean : 39 mm

Example 2

The tests of Example 1 were repeated with a reactive composition comprising milled and screened sodium bicarbonate, 1.89% by weight of basic magnesium carbonate and 5% by weight of lignite coke (the contents of basic magnesium carbonate and of lignite coke are expressed with respect to the weight of sodium bicarbonate [lacuna]). The screening of the sodium bicarbonate was adjusted as in Example 1, so that it is in the form of particles not exceeding 13 μm in diameter, the reactive composition exhibiting a

particle size defined by the following characteristics
(defined above), expressed in μm :

5 D10 [sic] = 6.6
 D50 [sic] = 33.7
 D90 [sic] = 75.4

After storage for three months, the following
results were obtained:

Tendency to cake (test on three samples): 0%

10 Mobility (test on five samples): Sample No. 1: 34 mm
 Sample No. 2: 38 mm
 Sample No. 3: 37 mm
 Sample No. 4: 36 mm
 Sample No. 5: 39 mm
15 Mean : 37 mm

Example 3

20 The tests of Example 1 were repeated with a
 reactive composition comprising milled and screened
 sodium bicarbonate and 5.1% by weight of lignite coke,
 the content of lignite coke being expressed with
 respect to the weight of sodium bicarbonate. The
 screening of the sodium bicarbonate was adjusted as in
 Example 1, so that it is in the form of particles not
 exceeding 13 μm in diameter, the reactive composition
25 exhibiting a particle size defined by the following
 characteristics (defined above), expressed in μm :

 D10 [sic] = 7.0
 D50 [sic] = 35.1
 D90 [sic] = 85.0

30 After storage for three months, the following
 results were obtained:

Tendency to cake (test on three samples): 0%

35 Mobility (test on five samples): Sample No. 1: 37 mm
 Sample No. 2: 38 mm
 Sample No. 3: 41 mm
 Sample No. 4: 40 mm
 Sample No. 5: 38 mm
 Mean : 39 mm

The preceding examples show that the reactive

compositions in accordance with the invention correctly endure storage for several months. A comparison of the results of Examples 2 and 3 with those of Example 1 furthermore show [sic] that the absence of silica in the reactive composition is not harmful to its ability to be stored.

Examples 4 to 6

In Examples 4 to 6, the tests of Example 1 to 3 respectively were repeated with a storage time of six months. The characteristics of the compositions are given in Table 1 below.

Table 1

	Examples [sic] No.		
	4	5	6
Silica (%)	0.5		
Basic magnesium carbonate (%)		2	
Lignite coke (%)	5	5	5
D10 [sic] (μm)	7.6	12.3	7.7
D50 [sic] (μm)	30.0	41.2	36.7
D90 [sic] (μm)	69.1	83.4	79.4

The results obtained after storage for six months are given in Table 2 below.

Table 2

	Examples [sic] No.		
	4	5	6
Tendency to cake			
Sample No. 1	0	0	0
Sample No. 2	3.2	0	0
Sample No. 3	3.1	0	0
Sample No. 4	1.8	0	0
Sample No. 5	0	0	0
Mobility			
Sample No. 1	43	29	43
Sample No. 2	41	30	38
Sample No. 3	46	29	43.5
Sample No. 4	44	28	45
Sample No. 5	43	30	41

Examples 4 to 6 confirm the results of Examples 1 to 3 by demonstrating the excellent ability of the silica-free reactive compositions according to the invention.

5 Second series of tests

Examples 7 to 10 relate to tests carried out with the aim of measuring the effectiveness of reactive compositions in purifying a gas from hydrogen chloride.

10 The gas treated in each test was a flue gas originating from an incinerator of domestic waste comprising hydrogen chloride and sulphur dioxide. An at least sufficient amount of a reactive composition comprising sodium bicarbonate was introduced into the flue gas to bring its residual content of hydrogen
15 chloride below 50 mg/Sm³ (European Standard 89/369/EEC) or below 10 mg/Sm³ (European Standard 94/67/EEC or German Standard 17.BIm SchV). After addition of the reactive composition, the flue gas was filtered through a filter cloth to remove dust therefrom.

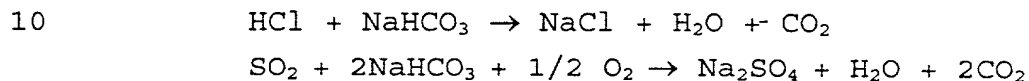
20 Example 7 (in accordance with the invention)

In this example, the reactive composition employed consisted essentially of sodium bicarbonate, without additive. In particular, the reactive composition was devoid of silica.

25 The test lasted 390 minutes. During the test, the flow rate of the flue gas, the throughput of the reactive composition introduced into the flue gas and the contents of hydrogen chloride and of sulphur dioxide in the flue gas were continuously measured,
30 respectively upstream of the addition of the reactive composition and downstream of the filter cloth. From these measurements, the stoichiometric ratio (S.R.) of the amount of sodium bicarbonate actually employed to the stoichiometric amount required, on the one hand,
35 and the degree of purification from hydrogen chloride, the latter being defined by the relationship

$$\tau = \frac{\text{HCl}_i - \text{HCl}_f}{\text{HCl}_i} \times 100,$$

where HCl_i denotes the content of hydrogen chloride in the flue gas upstream of the addition of the reactive composition and HCl_f denotes the content of hydrogen chloride in the flue gas downstream of the said addition [sic], on the other hand, were calculated. In the test, the stoichiometric amount of sodium bicarbonate is that required to remove the hydrogen chloride and the sulphur dioxide from the flue gas, according to the following theoretical reactions:



The results of the test (arithmetic mean over the 390 minutes) are recorded below:

Flue gas

15	Flow rate (Sm^3/h)	:	2378
	HCl_i (mg/Sm^3)	:	1530
	HCl_f (mg/Sm^3)	:	9

Reactive composition:

	$NaHCO_3$ throughput (kg/h)	:	13
20	S.R.	:	1.49
	Degree of purification (%)	:	99.4

Example 8 (not in accordance with the invention)

The test of Example 7 was repeated with a reactive composition composed of sodium bicarbonate and silica (0.5 g of silica per 100 g of sodium bicarbonate). The results of the test (which lasted 360 minutes) are given below.

Flue gas

	Flow rate (Sm^3/h)	:	1697
30	HCl_i (mg/Sm^3)	:	2018
	HCl_f (mg/Sm^3)	:	39

Reactive composition:

	$NaHCO_3$ throughput (kg/h)	:	26
	S.R.	:	3.07
35	Degree of purification (%)	:	98.1

A comparison of the results of Example 7 (in accordance with the invention) with those of Example 8 (not in accordance with the invention) immediately reveals the advantage of avoiding, in accordance with

the invention, the presence of silica in the reactive composition.

Example 9 (in accordance with the invention)

5 The test of Example 7 was repeated with a reactive composition in accordance with the invention which is devoid of silica and is composed of a homogeneous mixture of sodium bicarbonate and basic magnesium carbonate (2 g per 100 g of sodium bicarbonate). The results of the test (which lasted 67
10 hours) are given below. -

Flue gas

Flow rate (Sm^3/h)	:	24,000
HCl_i (mg/Sm^3)	:	1060
HCl_f (mg/Sm^3)	:	32

15 Reactive composition:

NaHCO_3 throughput (kg/h)	:	63.7
S.R.	:	1.11

Degree of purification (%)	:	99.0
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Example 10

20 The test of Example 7 was repeated with a reactive composition in accordance with the invention which is devoid of silica and is composed of a homogeneous mixture of sodium bicarbonate and lignite coke (5 g per 100 g of sodium bicarbonate). The results
25 of the test (which lasted 81 hours) are given below.

Flue gas

Flow rate (Sm^3/h)	:	24,000
HCl_i (mg/Sm^3)	:	925
HCl_f (mg/Sm^3)	:	46

30 Reactive composition:

NaHCO_3 throughput (kg/h)	:	63.8
S.R.	:	1.09

Degree of purification (%)	:	>99.9
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35 Examples 9 and 10 show the positive influence of the basic magnesium carbonate and lignite coke on the effectiveness of the reactive composition.

CLAIMS

1. Solid pulverulent reactive composition for the purification of a gas, comprising sodium bicarbonate and a caking inhibitor for sodium bicarbonate,
5 characterized in that the inhibitor comprises lignite coke and/or a magnesium compound comprising magnesium (hydr)oxide.
2. Composition according to Claim 1, characterized in that it is substantially devoid of silica.
- 10 3. Composition according to Claim 1 or 2, characterized in that the magnesium compound comprises basic magnesium carbonate.
4. Composition according to any one of Claims 1 to 3, characterized in that it comprises at least 90% by
15 weight of sodium bicarbonate and in that its content by weight of inhibitor is greater than 0.5% of the weight of sodium bicarbonate.
5. Composition according to Claim 4, characterized in that, in the case where the inhibitor comprises a
20 magnesium compound, the latter is present in an amount by weight at least equal to 2% of the weight of sodium bicarbonate.
6. Composition according to Claim 4, characterized in that, in the case where the inhibitor comprises
25 lignite coke, the latter is present in an amount at least equal to 5% of the weight of sodium bicarbonate.
7. Process for the purification of a gas, according to which a reactive composition comprising sodium bicarbonate is introduced into the gas and the
30 gas is subjected to removal of dust, characterized in that the reactive composition is substantially devoid of silica.
8. Process according to Claim 7, characterized in that the removal of dust comprises filtration through a
35 filter cloth.
9. Process according to Claim 7 or 8, characterized in that the reactive composition is in accordance with any one of Claims 2 to 6.

10. Process according to any one of Claims 7 to 9,
for the purification of a gas from at least one
contaminant selected from hydrogen chloride, hydrogen
fluoride, sulphur oxides, nitrogen oxides, dioxins and
5 furans.

ABSTRACT

Pulverulent reactive composition and process for the purification of a gas

Solid pulverulent reactive composition for the purification of a gas, the said composition comprising sodium bicarbonate and a caking inhibitor for sodium bicarbonate comprising lignite coke and/or a magnesium compound comprising magnesium (hydr)oxide. Process for the purification of a gas, according to which a reactive composition comprising sodium bicarbonate which is substantially devoid of silica is introduced into the gas and the gas is subjected to removal of dust.

Figure 2 [sic].

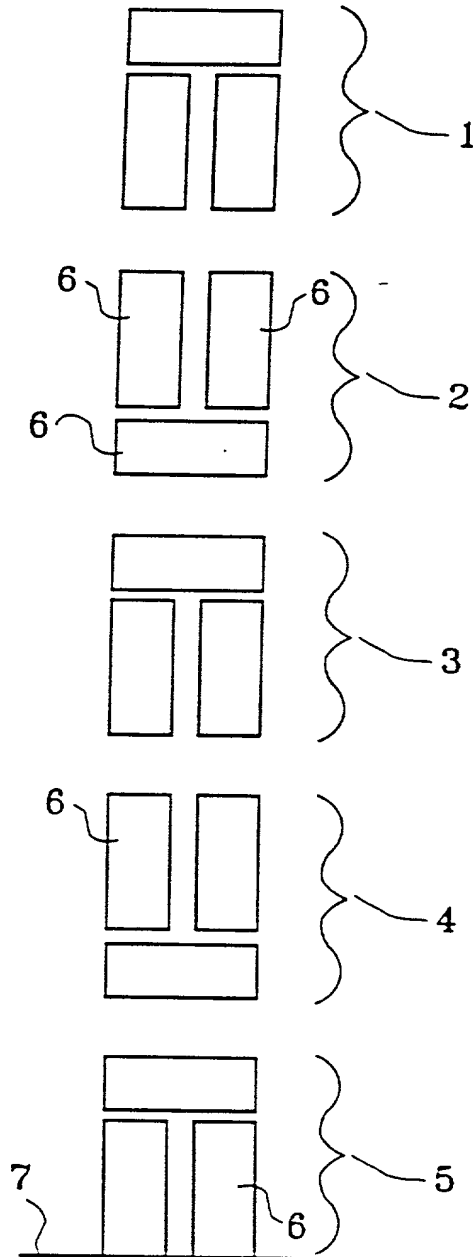
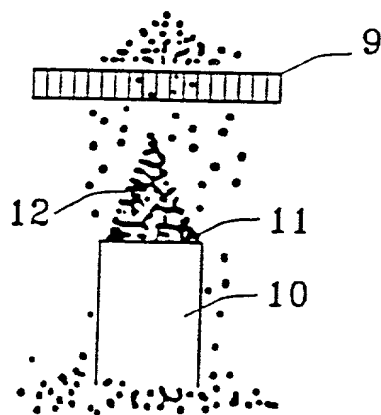


FIG. 1

FIG. 2

10/96b

DECLARATION FOR UNITED STATES PATENT APPLICATION,
POWER OF ATTORNEY, DESIGNATION OF CORRESPONDENCE ADDRESS

Attorney Docket

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and that I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled Pulverulent reactive composition and process for the purification of a gas

the specification of which

[] is attached hereto.

[] was filed on _____ as Application No. _____

and was amended on _____ [if applicable].

[] was filed under the Patent Cooperation Treaty on _____

Serial No. _____, the United States of America being designated.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent, utility model, design or inventor's certificate listed below and have also identified below any foreign application(s) for patent, utility model, design or inventor's certificate having a filing date before that of the application(s) on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

Number	Country	Date Filed	Yes	No
09700417	BELGIUM	MAY 14, 1997	X	

8 I hereby appoint the following attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: George H. Spencer (Reg. No. 18,038), Norman N. Kunitz (Reg. No. 20,586), Robert J. Frank (Reg. No. 19,112), Gabor J. Kelemen (Reg. No. 21,016), Robert Kinberg (Reg. No. 26,924), John W. Schneller (Reg. No. 26,031), Ashley J. Wells (Reg. No. 29,847), Allen Wood (Reg. No. 28,134) Suite 300 East, 1100 New York Avenue, N.W., Washington, D.C. 20005-3955, Telephone: (202) 414-4000, Telefax: (202) 414-4040. Address all correspondence to SPENCER & FRANK, Suite 300 East, 1100 New York Avenue, N.W., Washington, D.C. 20005-3955.

The undersigned hereby authorizes the U.S. attorneys named herein to accept and follow instructions from the undersigned's assignee, if any, and/or, if the undersigned is not a resident of the United States, the undersigned's domestic attorney, patent attorney or patent agent, as to any action to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. attorneys and the undersigned. In the event of a change in the person(s) from whom instructions may be taken, the U.S. attorneys named herein will be so notified by the undersigned.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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